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THE SOIL CONSERVATION SERVICE AND ITS WORK

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There probably is in the United States no one natural resource of more significant value to the present and future development of the country than the soil. Soil, with proper utilization, is not used up, and remains as a permanent asset to the nation. Therefore, users of the soil and the nation as a whole, under the coördinated program of the Soil Conservation Service, retain the broad fertile acres covering fairly level and gently sloping crop land, the equal of which, in extent, fertility, climatic conditions favoring use and for accessibility to market demand cannot be found in any other part of the world. This soil has in the past, and may in coming years, render possible an agriculture that can be a lasting foundation for the future welfare of the country, enabling Americans of the future to carry forward under the same high standards of living and of national independence as they have enjoyed in the past.

Without the soil resource of today, agriculture would be curtailed and this progressively would limit the development of every other economic undertaking. Thru the complex interrelationship of modern economic life, agriculture is not a field of activity existing within itself, but it is a basic enterprise the product from which enters into other enterprises such as commerce and manufacturing.

Soil conditions and the soil of today in the United States are far from being what they were when the country first was settled, and when the fields first were plowed and grazed. Agriculture has disturbed the balance between soil removal and soil building developed thru ages by the interrelationship between running water, slope, surface material, vegetation, and climate. According to the 1930 Census, 359,000,000 acres of crop land were harvested, and in 1934, 296,000,000 acres. Altho the total area of the United States is more than 1,900,000,000 acres, more than one-half of this is too

high, too dry, too cold, too rough, or too rocky for agriculture under humid conditions. Of the less than one-half the area of the country which, on the whole, has sufficient precipitation, long enough growing season, low enough elevation, and enough soil rather than rocks, for agriculture, there are many localities where untoward physical conditions prevent cultivation. This further cuts down the crop area of the country, and emphasizes the necessity for preserving the soil on our arable acres, and for arresting the processes of soil destruction and soil removal at work in many parts of the country on valley crop lands and upland forested watersheds related to them.

SOIL CONSERVATION SERVICE

The work of the Soil Conservation Service of the Department of Agriculture is that of arresting soil erosion by fostering and spreading agricultural practices which will rebuild as well as preserve the soil. Within about 500 demonstration areas in every section of the country, averaging about 25,000 acres each in extent, the Soil Conservation Service is cooperating with the farmers and land owners in the application of a coördinated soil conservation program, based on the principles of good land use.

Because erosion is due not to immediate or single causes, the remedies for it likewise call for a coördination of many different and widely separated physical factors. Thus the Soil Conservation Service has evolved the coördinated program which takes into consideration the many different kinds of land, the varied needs of the individual farmer, and the broad range of conditions from the summit of the watershed to the valley floor. Thru coöperation with individual farmers, in this cördinated program of soil conservation, the Service is *showing* by actual *doing* what can be accomplished in soil conservation. It is stimulating interest well beyond the bounds of its projects, so that sound soil conserving practices now may be seen, even by casual observers, outside the soil conservation demonstration areas. Thru such stimulation of interest, thru leading many to imitate methods that have been of benefit to their neighbors, soil conserving farm practices will spread thru the farm land of the country.

ORIGINAL VEGETATION ON VIRGIN WESTERN RANGE

When making some field studies recently in the West the contrast thruout wide areas of present day with virgin conditions,

came with vivid realization. For example, on a few nearly inaccessible rock shoulders along such valleys as those of the Snake and Columbia rivers, or farther south high up in the mountains along headwater slopes of the Salt River in Arizona, there are thick smooth stands of rich bunchgrass, remnants of what covered all these valley slopes when the first explorers traveled thru these same valleys.

When the Hayden Expedition explored the West in 1870, they found on the Great Plains at the foothills of the Wyoming Mountains, high thick grass such as blue grama, dropseed, and wheatgrass growing well up to the horses' knees. Today this entire area is covered with sagebrush. At other places such as that along Henry's Fork near its junction with the Green River in Daggett County, Utah, high thick grass was growing where today sagebrush is dominant. In many high smooth-floored mountain valleys there was a thick stand of western wheatgrass and of big bluestem. Today these same valley floors are covered with sagebrush, and deep steep-sided forking gullies have destroyed the former smooth valley pastures.

As recently as twenty-four years ago virgin bunchgrass covered the Colville Indian Reservation on the Okanogan Plateau, because, until then the land had been used only for scattered Indian grazing. At that time outside the reservation little but sagebrush was to be seen, and the range was nearly bare. Today all this same area is covered by sagebrush and scarred by erosion.

Soil Conservation Service—Work in the Palouse Hills

The fine deep soil of the Palouse Hills of eastern Washington and adjacent Idaho was covered with a thick stand of native bunchgrass, but wheat cultivation has long since removed this protective soil cover over large areas. After harvesting the wheat, stubble has been burned, then the soil pulverized and left bare for summer fallow. Wind and rain carried away their toll of the fine rich bare soil. Great gullies formed in many places at the base of the slopes, as the water drained down thru drill furrows, in some cases undermining many square yards of land where gophers or other burrowing animals had made their holes.

Winter snow accumulated in great drifts on the many hilltops and hillsides. These great snow piles melted from time to time under every balmy chinook wind, sending veritable freshets over the bare soil, and cutting innumerable gullies into the smooth hill-

sides (Fig. 1). Enormous quantities of silt have been carried down to the base of the slopes, or spread across highways filling roadside ditches.

After studying this situation, the Soil Conservation Service, in coöperation with the farmer, has returned many of these hilltop fields and gullied lower slopes to grass, cultivating on the contour only the midslopes. Thru this practice much of the water that falls

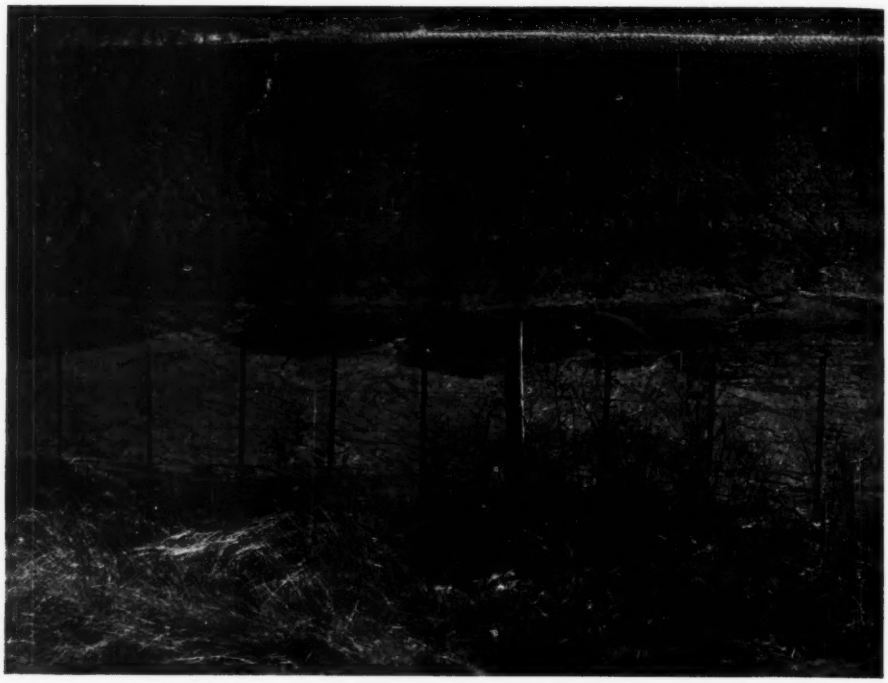

Fig. 1. Water from a hilltop snowbank has melted so as to gully this entire slope on a Palouse hill in Whitman County, Washington. Silt is piled up at the base of the slope. White spots in gullies at the left of the picture reveal places where the gully has cut down thru the top soil to the clay subsoil. Photograph by Soil Conservation Service, March 3, 1936.

on the slopes is caught in the furrows to be held until it soaks into the ground. Furthermore, farm machinery working on the level instead of straight up and down hill, as formerly, uses less fuel. The larger proportion of fuel was consumed in dragging heavy machinery up and down the hillside fields, so that in cost of cultivation and in yield, the hilltops were the least profitable part of the hills to cultivate. Consequently, when they are taken out of cultivation, put into grass, and grazed land, and, when the farmer plows always

on the level along the contour, there is on the whole a larger return from the land than under the old farm practices.

On other hilltops the Soil Conservation Service has planted trees such as Norway Spruce, Caragana, Russian Olive, and others suited to the climate. Snow gathers beneath these trees and melting snow water sinks into the ground among their roots and so does not rush down the slope in a gullying flood. Stubble instead of being burned is incorporated, holding the soil against wind and water erosion.

Extremely interesting and vivid results have been obtained on some of the Palouse Hills which were grazed and not cropped. Native bunchgrass apparently had almost disappeared from the slopes. The soil lay nearly bare of vegetation and cattle trails cut essentially every foot of the surface in criss-cross ridges. Today, growing where seemingly no bunchgrass was left, a soft brown cover has been brought back by grazing control. Among the places where this may be seen are some fields in Garfield County, Washington. Thru them runs an old pioneer soil fence, few of which remain as thrown up to mark the original land boundaries. It is paralleled by a modern wire fence. On the side of the fence where grazing has been controlled in coöperation with the Soil Conservation Service a rich stand of bunchgrass has been brought back, simply thru grazing control. In marked contrast, on the other side of the fence, where grazing has continued without regard to the carrying capacity of the range, the ground is almost bare.

The John Day and Rock Creek Country of Northern Oregon

On the Plateau south of the Columbia along the John Day River and Rock Creek, wheat has been raised for years by dry farming methods or the land has been grazed. Here, even on a day when there is practically no wind, tall thin spirals of soil formed by miniature whirlwinds may be seen dancing across the fields. On a windy day the valley leading up from Arlington on the Columbia River to the plateau is so filled with blowing soil that one can neither see nor breathe, and the fine soil chokes an automobile engine. Here at many places drifts of soil and sand have piled up along the fences, and sand dunes have built up in the fields. Much of this land should be returned to range. Here in coöperation with the Soil Conservation Service, pasture furrowing is being established on many steep ranges. These furrows catch the rain and

snow water, spread it out over the fields, and the native grass is being brought back.

Water is scarce in this John Day country and springs have been few and far between, down in the bottoms of deep valleys. Consequently land around the few water holes has become badly overgrazed. The Soil Conservation Service with the CCC camps assigned to it in this area has hunted out water veins in the valley bottoms, has blasted into these veins, and has covered over the springs thus made so as to protect them from trampling animals. Trees have been cut, hollowed, and laid end to end to be used as water troughs for grazing animals. The Soil Conservation Service with the aid of one CCC camp in this area has opened between forty and fifty such springs among the hills, bringing water onto the range where before there was no water. By realigning fences so as to distribute water holes to the best advantage thru the fields, they have eliminated concentration of cattle around a few water holes and the accompanying concentrated trampling and cutting of cattle trails. Thus with the more even distribution of animals over the range, a less heavy grazing burden is laid upon the grass, and the native vegetation is given a chance to reestablish itself.

THE SOUTHWEST: SILTED RESERVOIRS AND DENUDED RANGES

The natural reservoirs for waters coming into the storage reservoirs and streams of the Southwest are in the forest clad mountain tops of Arizona and New Mexico, and areas immediately to the north. Here among the thick growth of yellow pines, even in October, snow commences to fall and piles up wherever there is a shelter behind which a drift may lodge. As winter advances, snow becomes deeper in the dense growth of yellow pine, and finally roads are blocked so that automobiles cannot travel over them again until spring warmth melts the snow. Ponds form in hollows among the trees, and from them water gradually works down into the streams along underground drainage ways.

Within these mountaintop forest domains which have been set aside as National Forests and which are regulated by the Forest Service, there is protection. Here new growth is coming in and shrubs and grass cover the ground. Outside the National Forests, where grazing is little regulated if at all, trees are grazed of all branches within reach of the animals. The ground beneath them is bare of vegetation and gullies are working into the former smooth land beneath the piñon cover. While the upper forested watersheds

supply by far the larger share of water flowing into reservoirs such as those at Boulder and Roosevelt Dams the lower slopes, in contrast, contribute comparatively little water but more than one-half the silt entering the reservoirs.

Silting has become a serious problem. More than a square mile of silt ten feet deep* is, each year, filling the reservoir at Roosevelt Dam, which means that each year fewer acres of rich irrigated land can be watered down in the Salt River Valley. Great fans of silt extend delta-like from the slopes of Apache Lake at Roosevelt Dam down into the waters of the lake, and along tributary reservoirs the the silt shows even more clearly. Below Horse Mesa Dam, on the upper reaches of Salt River a short distance below Roosevelt Dam, only a thin stream of water is flowing thru the silt which has all but filled the reservoir basin.

Erosion is even a more serious matter on the watershed of the Little Colorado River and its tributary branches in the Navajo Indian country in northeastern Arizona. All thru this region, formerly one of the richest grasslands in the West, where the grass grew "belly-high on the horse," overgrazing has been most severe. Whole areas are bare of grass, the soil is blown off, and wind erosion pavements are forming. In other places, over miles of territory only poor weedy growth appears, and great arroyos have cut their vertical sides down ten, twenty, and thirty feet into what was formerly a smooth unbroken range. Water has gathered into cattle trails or wagon ruts, cutting deeper after each storm until the drainage that, in past times, flowed over grasscovered range on the level so that Indians could take off a little irrigation for their fields, is now below the reach of men or animals. The Indians are moving farther back onto the valley sides, cultivating their fields with the small amount of water which flows down from the piñon covered slopes in the draws. Even on the slopes among the piñon the ground is bare, and there is no young growth of piñon trees.

In a similar range country just over the Arizona line in New Mexico, north of Gallup, is found a wonderful contrast to this denudation. At Mexican Springs about three years ago, the Soil Conservation Service began work. They mapped the area and studied it carefully in order to evolve the best methods for protecting the land from erosion. Deep wide arroyos had formed on the principal drain-

* Henry M. Eakin, Silting of Reservoir, Technical Bulletin No. 524, U. S. Dept. of Agriculture, 1936, p. 12.

ages. The grass cover apparently was destroyed. Thin starved cattle, belonging to the Navajo owners of the land, were ranging far and wide to find a meager feed.

For a few months all cattle were removed from the range within the Mexican Springs Demonstration Area. It was fenced. An earthen dam with protected spillways at each end was built across

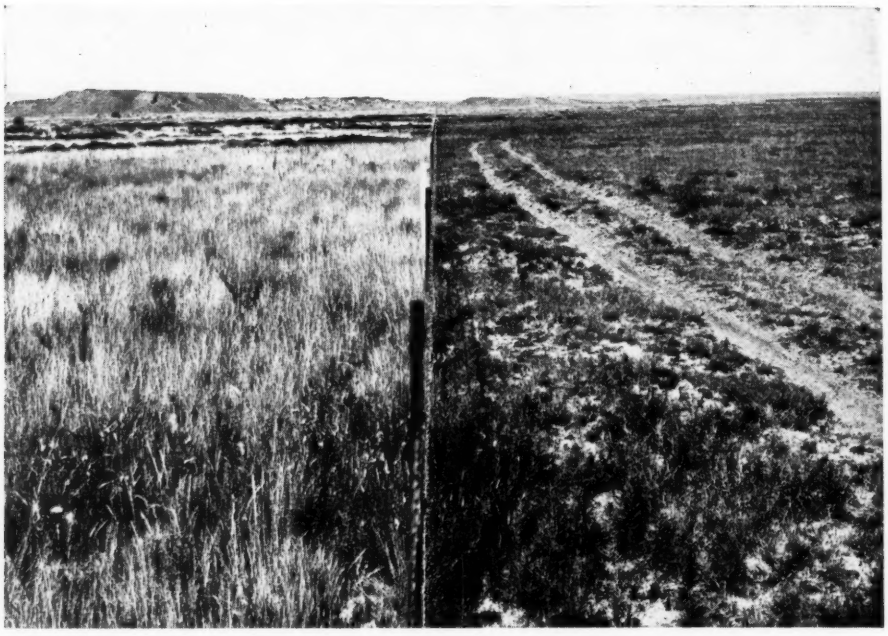

Fig. 2. The fence in the center of the picture bounds the demonstration project of the Soil Conversation Service at Mexican Springs, New Mexico. Grazing control and water conservation on the inside of the fence within the project have brought back the grass which stands thick and high, tho grazed. Outside the fence the land, weedy and bare in spots, has continued to be heavily overgrazed. This demonstrates graphically what proper regulation can do for western range lands. Photograph by Soil Conservation Service, 1936.

the main drainage. When rain fell, water began to pile up behind the dam. It flowed over the spillways spreading out over the bare range. Wherever it stood grass began to grow. Soon cattle were put back onto the range, but only in number commensurate with its carrying capacity. Inside the fence on the Mexican Springs area high native grass has been brought back thru this work of the Soil Conservation Service, and from across the valley it appears in autumn as a beautiful yellow-green strip against the brown of the rest of the range (Fig. 2). Outside the fence the ground

is almost bare, and only a weedy low thin growth appears. Grass from inside the Mexican Springs area weighs ten times as much as that in an equal area on the bare range. All these results have been acheived simply by saving the rainfall which falls so that it may soak into the ground as it formerly did on the virgin grass-covered range. No longer is water permitted to run off carrying away the soil and cutting the drainages deeper.

The Texas and Oklahoma Panhandles

About ten or twelve years ago land was broken for wheat in the Texas and Oklahoma Panhandles. It was the practice to burn the wheat stubble, leaving the fields bare during the period of summer fallow. Winds have torn into the bare soil carrying away much of the fine velvety most productive part, and in some places taking off all the soil and subsoil. This was the condition on the Peden field north of Dalhart, Texas, in 1935 when it lay bare and wind blown. The year 1936 was another drought year like that of 1935 and those immediately preceeding, but the owner of the field had entered into cooperation with the Soil Conservation Service, and had agreed to handle his large farm according to the coordinated program of that Service. He terraced his wind-blown field on the contour at a cost of $1.01 an acre in order to hold the May and other rains behind the terraces, then he seeded it to sorghum. In the fall of 1936 he harvested it at a net profit of $7.10 an acre. By leaving the sorghum stalks standing in the ground after combining, its roots and stalks now hold the soil from washing and blowing, thus providing the basis for permanent use of this seemingly destroyed land.

Soil has been piled up around more than one farmstead in the Texas and Oklahoma Panhandles. In some places fields have been so drifted and destroyed that owners have deserted their homes, tho in other cases it has been possible to dig out the houses and barns and continue use of the land. Drifting soil is piled along fence rows thruout the area, and after a dust storm roads are as impassable as those in the north following a blizzard, and cannot be used until they are dug out.

Blowing also has been particularly serious where stock have congregated and trampled the ground in the fields at windmill watering troughs, destroying grass cover and laying the soil bare to be torn into by the wind. For example, a few miles north of Dalhart, Texas, the land has been blown out near such a windmill over an area of a quarter to a half mile across and to a depth of twenty

to thirty feet down to the caliche. Old deeply furrowed cattle trails lead down into the hollow as is characteristic of such blow-outs.

Contour plowing of cropped land and pasture furrows along the contour of rangeland are important elements in the restorative program of the Soil Conservation Service for the Texas and Oklahoma Panhandles. The value of contour plowing was vividly illustrated after a rainstorm in 1936. On one side of the road a field had been plowed straight up and down the hill. In this field all water ran down the furrows gullying them and settling in a large puddle at the foot of the slope. Only where the water stood in this puddle did it soak into the ground to any considerable depth and provide moisture for a future crop.

Directly across the road the farmer had contour plowed his field. On it the water stood behind each furrow, spread out over the entire field, and penetrated deep into the ground ever the entire field, providing moisture over all the field for the crop which would be sown there. Obviously the saving or losing of water over the field may and does mean to the farmer the difference between a crop harvest and a crop failure.

Oklahoma: Central and Southern

In southern Oklahoma where the land begins to break off from the high plains toward the Red River, where both climate and soil are especially suited to cotton production, cotton has been raised for years on some of the slopes. The land has been plowed so that furrows run straight up and down the hill and run-off is concentrated in them, completely destroying the surface of the field, and carrying off all the topsoil and most of the subsoil. In contrast to this destructive farm practice, the Soil Conservation Service has introduced contour plowing and strip cropping. Alternate strips of cotton and Sudan grass have been plowed and planted on the contour. These hold most of the water in the fields. The close growing Sudan grass prevents soil wash and catches the wash from the clean-tilled cotton crop. These alternate strips of cotton and Sudan grass also tend to prevent wind erosion by acting as windbreaks. Thus thru prevention of wind and water erosion and conservation of water the yield is increased and the soil saved.

In southern Oklahoma there was located in the early days some of the richest cattle grazing lands from which animals were driven to railhead at Kansas City. Because of the fine soft character of the

soil in this region it is peculiarly susceptible to erosion. Close grazing that laid bare the soil, and a cattle trail or a road have started what is today more than one deep gully. Since slopes in this area are long, it is sometimes difficult to catch water before it reaches the head of a gulley, but a terrace is carried around the gully head and drainage into it thus is cut off. This permits the gulley to heal itself

Fig. 3. Pasture furrows near Amarillo, Texas, have held the water so that it soaked into the ground. Note the thicker higher growth near the furrows, and the gradual spreading of grass over the between-furrow spaces. This picture was taken less than a year after the furrows were turned. Tests show that the weight of grass on this pasture was 154.8 per cent greater than on adjacent untreated range land. Photograph by Soil Conservation Service, 1936.

for there is no scour thru it, slumps stay in place, and grass grows over the bare soil.

In this region if water can be kept on the range instead of flowing off immediately, the native grass will reestablish itself. In many pastures where the soil is almost bare and grass close-cropped to the roots, pasture furrows have been run on the contour. Soon grass commences to grow along the furrow. After each rain water fills the furrow and may back up behind it on the ground between the furrows. It soaks into the ground and grass begins to grow not only along the edge of the furrows, but runners spread out over the spaces between, until the grass forms a thick mat and stands

high (Fig. 3). There are many native grass seeds lying dormant in the soil, and tiny roots which have been kept so closely grazed that the grass from them has been unnoticed on the weedy overgrazed range. With pasture furrows holding the water so that it may soak into the ground and stimulate germination of these dormant seeds and encourage the grass roots to grow, the thick native grass cover will be brought back to the range. If, then, grazing is regulated, abundant native grass will continue to cover the range as a permanent capital asset for future grazing.

Conclusion

These are some of the results obtained by the Soil Conservation Service thru its coordinated program. Soil is being held in place, erosion stopped and prevented, and the native range grasses brought back. Thru this soil conserving work a sound foundation is being preserved for the agriculture of the future. If the downward course in soil loss were to continue, American living standards would follow the same downward path. By restoring and preserving the soil thru the coordinated program of the Soil Conservation Service, the Nation will possess a permanent foundation for its rich agricultural production and for a high standard of living. In this work of the Soil Conservation Service is bound up the entire future welfare of the Nation.

MERSEYSIDE*

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Merseyside, the second largest conurbation in the United Kingdom, had a population of approximately 1,500,000 in 1931, and an area of somewhat more than 170 square miles. Four inter-related units comprise the conurbation, namely, Liverpool, Widnes, Warrington and Ellesmere Port, named in order of area occupied (Fig. 1). This conurbation is situated in Western England on both sides of the navigable Mersey estuary which lies on the seaward margin of the largest area of dense population in the British Isles. Merseyside is chiefly interested in the commercial and the manufactural industries. There is much interdependence between the conurbation and the most densely populated and most highly specialized industrial areas of Britain which are in the hinterland.

Land Utilization

Land utilization on Merseyside is related generally to the Mersey estuary which is deepest near its mouth. Commercial uses of land are of parmount importance along the bottle-neck channel between the outer and inner estuaries. In that part of the estuary the tidal range is nearly 30 feet, and the ebb and flow of a large volume of water thru the constricted neck of the channel, with a velocity up to 6 or 7 miles per hour, produces a scouring action which keeps the channel at a natural depth of 50 to 60 feet at the lowest spring tides. An immense system of docks, warehouses, transit sheds, and other port forms stretches for nearly 8 miles along the waterfront on the Lancashire side of the Liverpool Unit. A less extensive system of port forms, about 2 miles, surrounds East and West Floats on the Cheshire side. Bromborough Pool has recently been improved to accommodate ocean-going vessels. Along the shallower parts of the estuary where navigability is reduced on account of large amounts of sand exposed at low tide, the land used for port purposes is less extensive, and is found mostly along the Manchester Ship Canal. Railway freight stations, goods yards, and storage spaces have developed inland near railway sidings and ter-

*The writer is indebted to Mr. L. A. P. Warner, General Manager and Secretary, Mersey Docks and Harbour Board, Liverpool, England, for furnishing the areal photographs.

minals. In each urban unit, except the Ellesmere Port Unit, a central business district extends inland from the estuary. An effective system of roads, canals, and railroads integrates the constituent parts of Merseyside, and binds Merseyside to the hinterland (Fig. 1).

Fig. 1. Built-up areas and transportation of Merseyside in relation to relief

Adjacent to the commercial uses of land are congested residential districts with few open spaces beyond which is a broken zone of suburban housing and large open spaces. Manufactural uses of land have a more equable distribution within the conurbation than have the commercial uses of land. The factories are scattered thruout each urban unit with noticeable concentrations along some parts of the docks, the rivers, the canals, and the main line railways.

The land utilization pattern on Merseyside is explained in part by natural environmental conditions. The land is comparatively level on Merseyside, there being few areas more than 200 feet in elevation. The Mersey estuary is navigable and deepest near its mouth, and the channel leading to the Manchester Ship Canal. Areas of blown sand to the north of Liverpool and Wallasey have been suitable for housing purposes and out-door recreation facilities. Underlying sandstone rock has furnished substantial building sites and some building materials, and has hindered very little the making of tunnels. Lastly, the well-developed system of regional transport facilitates the disposal of raw materials to manufacturing firms everywhere on Merseyside, and aids in procuring coal and salt from the near hinterland.

Industrial Pattern

Commercial and manufactural industries were the outstanding industries on Merseyside in 1931, each accounting for one-third of the total number of employed workers. In that same year approximately 90 per cent of all workers in industry were in the Liverpool Unit. Partly because of its size and strategic situation at the mouth of the estuary that urban unit had the largest percentage of workers in each order of manufactures.

Commercial Industries. The commercial industries have centered on the Liverpool Unit to a greater degree than have the manufactural industries. Ninety-four per cent of the commercial workers, but only 80 per cent of the manufactural workers on Merseyside in 1931 were in the Liverpool Unit. The Port of Liverpool is the second port in the United Kingdom both in tonnage and value.

For the heterogeneous class of commodities handled at the Port of Liverpool every type of modern port equipment is available and capable of handling the general and specialized cargo of ocean liner, tramp steamer, and coasting vessel.

Nowhere in western England is there a transport center that rivals that of Merseyside. Many arterial first class roads, main line railroads, canals, and airways furnish transport to suburban centers and interior regions. All the roads and railroads focus on Pierhead in Liverpool (Fig. 1), those on the Cheshire side reach Pierhead by way of ferries or tunnels under the Mersey. Main arterial canals, in turn fed by smaller canals, connect Merseyside with inland industrial regions. Only in a few places are the directions of transport radials greatly affected by the physical con-

formation of the terrain, or by the underlying rocks thru which tunnels have been bored. Direct routes are generally pursued partly on account of the comparatively level terrain. Within the conurbation existing roads have avoided the higher elevations and followed river valleys to a lesser degree than have railroads.

The Liverpood-East Lancashire Road, opened to traffic in 1933, was built to help alleviate the increasing traffic on the Liverpool-

Fig. 2. Areal view of pierhead buildings and landing stage, Liverpool

Warrington-Manchester Road (Fig. 1). It passes thru open country, with the exception of a few coal mining areas, and enters Liverpool on the north where there are connections with other roads leading thru Queensway to Birkenhead, Wirral, and North Wales.

The Mersey Road Tunnel, officially named Queensway, is the largest subaqueous vehicle tunnel ever to be built (Fig. 1). It was

completed in 1934. All main highways to Liverpool from the industrial areas in the North, the Midlands, and the South lead directly into the tunnel. Queensway assists in the free movement of Liverpool's local traffic, and places the Birkenhead dock system as well as the manufacturing areas on the Cheshire side of the Liverpool Unit on an equality, geographically, with those on the Lancashire side. The tunnel tends to increase the commercial predominance of Liverpool over North Wales and Cheshire and to hasten the process of centralization of the Liverpool business district (Fig. 2).

The outstanding importance of Merseyside as a commercial center and the concentration of that industry in the Liverpool Unit is due partly to natural factors. The Liverpool Unit is adjacent to the deepest parts of the Mersey estuary. The character of the terrain is fairly level. The old tidal pools, Bromborough and Wallasey, that once flowed into the Mersey, have been converted into port forms. Queensway and the East Lancashire Road are expected to enhance further the importance of the central business district in Liverpool. Lastly, the distribution of the more bulky commodities, salt, pottery, coal, and others, is made possible by the inland canals.

Sea Trade. The Port of Liverpool, a general and an industrial port, led all other ports in the United Kingdom in foreign export trade and in coasting trade with Northern Ireland between 1929 and 1933. It was second only to London in the tonnage and value of all trade, in foreign imports, and in general coasting trade. Moreover, it was surpassed only by Southampton in passenger trade. The downward trend of Merseyside's foreign trade, approximately 50 per cent between 1929 and 1933, was comparable to that of the United Kingdom. Transit trade and passenger trade declined in the post-war period. Almost three-fourths of the trade of the Port was related to British industry. Nearly one-half of the total value of imported commodities were foods, and one-third were industrial raw materials while almost nine-tenths of the exports were manufactures. In foreign trade the total arrivals were much larger than the total departures. There were more vessels leaving than arriving in ballast. That characteristic is to be expected in a region that needs to import large amounts of foods and industrial raw materials. The Port of Liverpool trades with practically every continent and with almost every port in the world. It is the one British port preëminently concerned with the trade of the Atlantic Coast of North America.

The high rank of Merseyside as a trading center is attributed chiefly to natural items. The conurbation has a favorable position in relation to industrial Britain and the Atlantic Coast of North America, but a remote location with respect to the Continent. The very dense and highly specialized industrial population in the hinterland demands large quantities of foods and raw materials as well as outlets for manufactured wares. The purchasing power of

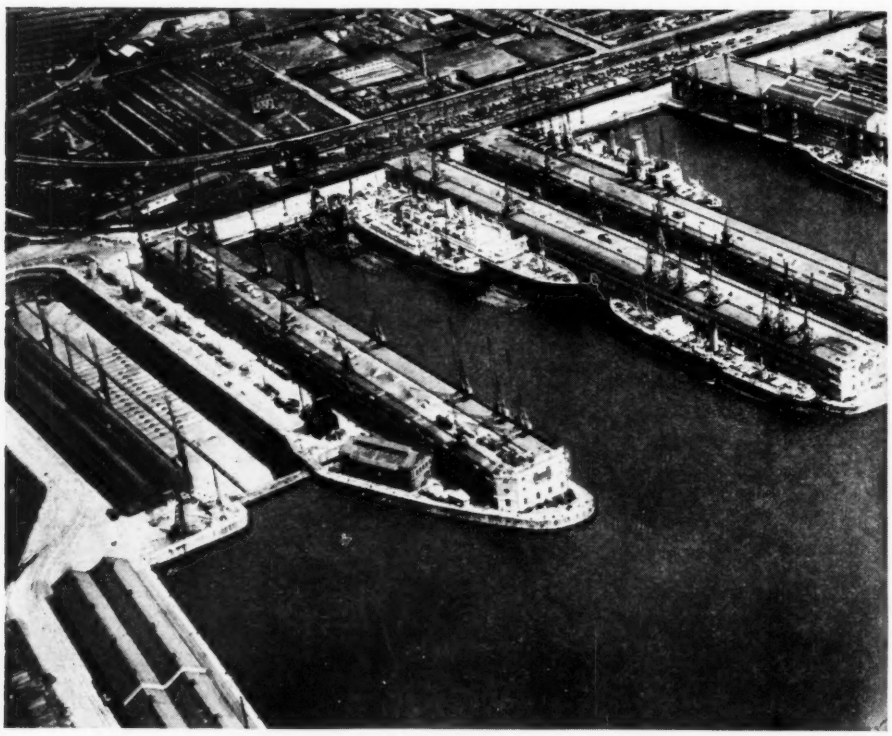

Fig. 3. Areal view of the Gladstone docks, Liverpool

peoples living in low and low-middle latitude regions has decreased making them less prone to purchase the high-quality British goods. Certain foreign nations such as Japan have been able to capture the markets in those regions. And, the modern port equipment on Merseyside is better able to handle the ocean leviathans than is the equipment at numerous smaller ports in the United Kingdom (Fig. 3).

Manufactural Industries. The importance of Merseyside as a commercial center has tended to minimize its importance as a manu-

factural center. This impression is probably due to the diversification in the size of the manufactural forms, in the quantities and kinds of goods fabricated, and in the areal distribution of the factories. None have centered on Merseyside, with the exception of flour milling and chemical manufacturing, to a greater degree than in any other region of the United Kingdom. That manufacturing has tended to expand recently is indicated by the many new indus-

Fig. 4. Flour Mills, west float, Birkenhead

trial plants that have been established on Merseyside since 1924.

The manufactural forms do not conform strictly to zones. However, there are noticeable concentrations in places near docks and main transport radials. Elsewhere they are scattered thruout the built-up areas. Most of the orders of manufactures are associated with the Port and its trade, or with the densely peopled areas within the conurbation and near hinterland and their needs. There are certain areal specializations of manufactures such as, soap making in Port Sunlight, alkali manufacturing in Widnes, flour milling (Fig. 4) and shipbuilding in Birkenhead, oil refining in Stanlow and

Dingle, wire making in Warrington, artificial silk manufacturing in Aintree, jam manufacturing in Fazakerley, and sugar refining in Liverpool.

The manufactural industries are explained in larger measure by natural conditions. The majority of plants have been built on land 100 feet and less in elevation. The world-wide ramifications of the trade of the Port supply a somewhat heterogeneous class of bulky raw materials, and an outlet for manufactured goods. The deep estuary is adapted to shipbuilding. The very dense population in the conurbation and in the hinterland furnishes a home market as well as a constant supply of labor. Cheap hydro-electric power, gas, and water of high quality is available, and is comparably cheaper than in most other large industrial centers in Britain. Coalfields in South Lancashire and North Wales, salt deposits in and around Northwich and Fleetwood, and limestone, red sandstone, and boulder clay on Merseyside are accessible. Lastly, the transport lines are useful not as sites for factories, but as means of conveying manufactured goods, laborers, and raw materials.

Pattern of Whole

Merseyside then is a commercial and manufactural region ranking second, as does the Port of Liverpool, among other major conurbations of the United Kingdom. Those distinguishing characteristics are related in part to the comparatively level relief, mostly less than 200 feet. Areas of sandstone, boulder clay, alluvium, and blown sand lie within the built-up areas while coal measures and salt deposits lie in the hinterland. The navigable bottle-neck Mersey estuary has numerous sand bars in the channels of the outer and inner estuaries. The largest areas of dense population and the most highly specialized industrial areas of Britain lie in the hinterland. And finally, the conurbation has a strategic location on the west coast of Great Britain, facing Ireland and the Atlantic coast of North America.

IGUALA: A TOWN IN SOUTHWESTERN MEXICO

BEN F. LEMERT AND ROSE V. LEMERT
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The largest city along the automobile highway between Mexico, D.F., and Acapulco at its Pacific terminal is Iguala. The highway passes right thru Cuernavaca with its crowds of tourists. It skirts Taxco but that city has already built down to it. Iguala lies about a quarter of a mile to the west of the highway. The road leading in to the city is always either dusty or muddy and far from smooth. Trees hide the buildings for the Indian likes to sit in the shade.

History mentions Iguala as the place where Vicente Guerrero, the mule driver, met Agustin Iturbide, the noble, and agreed upon the Plan de Iguala promoting the independence of Mexico. The guidebooks either omit the name of the city or give it slight attention. There are no notable ruins close, the Pacific is only 165 miles south, the tourists do not like anything calling for effort on their part, lack imagination, and the fascinating stories to be read in the faces of the 12,000 people in Iguala, and interpreted from their economic activities, call for thinking and the use of geographical knowledge.

Iguala lies in a little valley which roughly assumes the shape of a crescent. The valley is one of the parallel valleys which occur repeatedly after one passes over the volcanic mountain barrier south of the Valley of Mexico. It is a minor flexure in the Balsas Portal, a geosyncline that is thought to have extended from the Gulf of Mexico to the Pacific. For an extended period the débris from the mountains to the north and to the south washed into it. Finally, during the Laramide Revolution, a time of great crustal disturbance in North America, the Balsas Portal was elevated above sea level. The limestone, shale, and sandstone deposits were faulted and folded into parallel ridges extending east and west, and between each ridge a valley remained. The elevation of the valley floors trends lower as the Pacific is approached. The Balsas River, rising in the vicinity of Puebla, flows for more than 500 miles thru this region before it turns into the Pacific. Many smaller valleys are tributary to it. That in which Iguala is located is one of them.

Iguala is a tropical city in a tropical valley. The equator is only 18° southward, the sun is always high in the sky at noon, and the

floor of the valley is but 2,820 feet above sea level. There are no jungles, no tropical rainforests. The floor of the valley is covered with grass with here and there patches of corn, sugar cane, and rice. The days are warm if one is exposed to the sun. The heat is not uncomfortable. The sensible temperatures are not oppressive. It is always cool in the shade. The air is dry. The coolness of the shade is made even more apparent because of the intense light of the sun. When that body is directly overhead the white light seems to penetrate the human flesh, especially that of the white man, producing a feeling of exhaustion that is more like mountain sickness than heat prostration.

The floor of the valley is grass covered because there is not enough annual precipitation to support trees. Mountains surround the valley. The few small streams either flow into Lake Tuxpam in the eastern end of the valley, or cut their way thru the mountain barriers and reach the Balsas River. For the most part these streams carry little water except at times of thunderstorms. From October to May the northeast trade winds blow across the valley. Since these winds are blowing towards a warmer region their ability to absorb moisture is continually increasing. Having passed over high mountain ranges before reaching the valley about Iguala, they have already precipitated much of the moisture they might have been carrying. From May to October the rain comes in the form of convectional storms for solar insolation is intense while the upward movement of air currents is violent. The high sun speeds up evaporation and lowers the utility of the precipitation.

The little stream courses across the valley are lined with trees for such location permits the roots to obtain a year-round supply of moisture. The grass of the valley extends right up to the base of the mountains where xerophytic vegetation takes its place, especially on the leeward southfacing slopes. At higher elevations where windward exposures extract enough moisture from the winds, oak, pine, and cedar forests grow. At other places such windward exposures are not existent, the mountain sides remain barren and are deeply eroded by the torrents which rush down across them during the occasional cloudburst-type of thunderstorms.

The streams, in crossing the valley have become deeply incised, some places from 10 to 20 feet beneath the valley floor. Cusps formed by the meanders of the currents at different levels form wide platforms that almost might be classed as second bottoms. Normally the streams are mere trickles of water. However, most of them

have cut their way down thru the mountains passing thru deep barrancas. The mountain slopes on either side are high and steep and form large drainage surfaces. The wet season thunderstorms, occurring in mid-afternoon or during the night, may be of extreme violence. We have seen creeks which were almost dry at sunset, turned into raging torrents less than an hour after the storm broke. The incised valleys fill quickly, the water spreads over all the land for many yards on either side of the stream channel and the current carries a large amount of débris in its rush downstream. The heavy downpour brings down large quantities of cold air, the

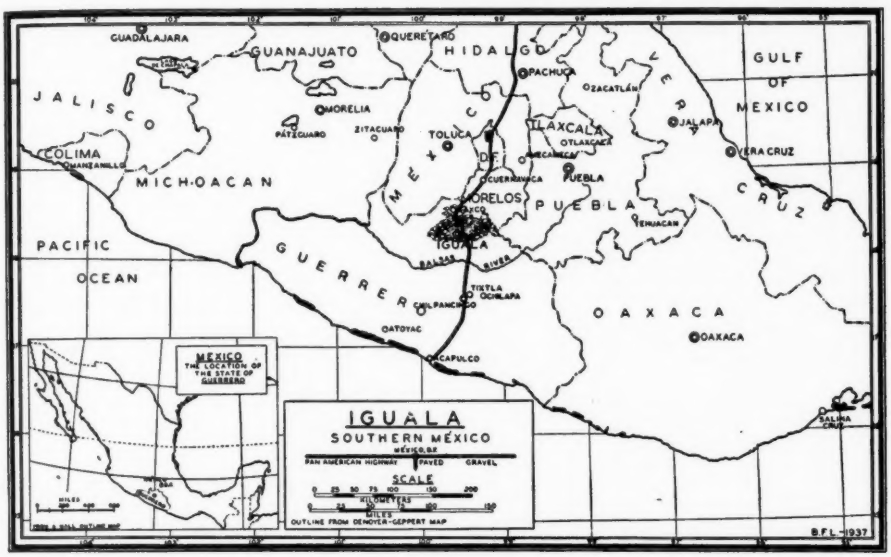

Fig. 1

water is icy cold, and the temperature for the few hours between termination of the storm, and daybreak, is delightfully cool if not chilly. The morning sun floods its light thru a clear, bracing atmosphere. The ground is already dry for the soil is porous and the water that does not run off quickly, sinks below the surface. An hour after sunrise everything is dry again, the trickle of the water in the creek is clear. One, unfamiliar with weather conditions in such regions could not realize the danger of pitching his tent anywhere near the streams. The scene during the storm, with water leaping down the mountain sides, piling up at the bottom of the gorge and hurling huge boulders before it, is not easily forgotten.

Dams could be built across these mountain valleys to hold back

the water for irrigation but they would not be feasible. Each year they would have to be built higher and higher because of the piling-up of débris behind them. The barren mountain slopes could not be covered with vegetation for they would not support it. However, where they are not too high, they could support large groves of olive trees. Mexico imports over one million pesos worth of olive oil annually. There is no reason why this could not be raised within its own territory.

The grassy plains about Iguala are occupied by cattle, sheep, goats, horses and burros. More animals could be supported. However, the state of Guerrero has been the scene of intense revolutionary activities during the struggles of the Mexican people. Raiding armies eat meat animals and ride away on beasts of burden. It takes time to recover confidence in government and to breed up new herds. With many acres to wander over, the sheep and goats seek the higher sides of the valleys among the outcrops of limestone. The cattle always graze along the highway and even the horses and burros tend to follow their example.

Most of the people utilizing the land in the valley live in Iguala, but up every barranca opening into the valley are Indians living on small plots of land just above reach of flood waters. Some of the huts are made of adobe, especially if at higher elevations for the temperatures in such locations are likely to be rather cold at night. At lower elevations the huts are made of interwoven sticks and grass. Both types of dwellings are covered with thatched roofs. Around the houses are small gardens where they produce the vegetables they take to the market in Iguala. Each family also raises some chickens and turkeys, some pigs, has a cow or two and the inevitable burros. All produce products contributing to the economy of the household.

Of course all the land available is planted with corn and beans, the food of the Mexican people. They eat the corn from the cob after boiling it in water before removing the husk. The commonest form of use is the tortilla. The housewife grinds up the dry kernels of corn in a metate, a piece of porphyry hollowed out in the center, the grinding being done by means of rubbing the kernels around the vessel and pounding them with another piece of porphyry. After the flour is made the woman squats before another piece of porphyry, this time the stone being rectangular shaped with a depression hollowed out on top. Taking some of the ground grain from a jar the woman places it on the metate (same name as

the grinder) mixes in some water from another jar and proceeds to kneed it with a cigar-shaped piece of porphyry. As the dough takes form she bunches it into balls and lays them on another tray in front of her until she has kneeded the required amount. She then pinches off pieces of the dough, pats it into flat cakes and places them on a piece of stone or sheetiron laying on top three stones or bricks, between which is a small fire of wood or charcoal. The cakes, looking like pancakes, cook slowly and when done she places them

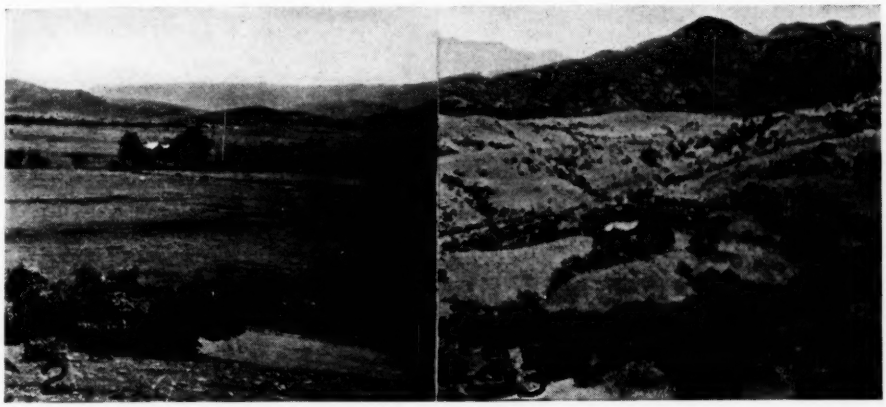

Fig. 2. A view across the center of the valley. This valley is but 18° from the equator and the sun is directly overhead twice a year. It is not covered by jungle or rainforest because the mountain walls shut off the moisture bearing winds. The winds are also moving towards the equator and getting warmer, therefore they continually increase their capacity to absorb moisture. The light rainfall received is convectional during the time of highest sun. The trees in the foreground obtain their moisture from a small stream course.

Fig. 3. A self-subsistent Indian home in a mountain valley. The crops are down where they can obtain moisture. Cattle and burros graze the grass of the lower slopes; sheep and goats on the upper slopes. The vegetation changes to xerophytic higher up and finally turns to forests of pine, oak, and cedar where the mountains are high enough to wring moisture from the winds.

in another jar until ready for consumption. The smack, smack, smack of the hands of the tortilla makers is a common sound early in the morning wherever the Mexicans live, be it on the land, in the town, or in the large city. It is the bread of the people. The cakes may be eaten with meat, may be wrapped around meat and vegetables, or they are very nourishing alone. A few tortillas tucked in the grass sack hanging from the belt of the laborer, the pack carrier, or the soldier, will feed him for days.

The city of Iguala lies in the western end of the valley close to the mountains. The plan of the city, like that of most Mexican con-

centrations of people, is rectangular, the plaza in the center. The streets are prevailingly narrow, some of them twenty feet wide, most not so wide. Streets immediately bordering the plaza and for a block or two from it are cobbled, the surface of each street slanting downward toward the center where the rain water collects and runs off, and where too, quite often waste water is thrown to make its way to lower levels or evaporate in the dry hot atmosphere. Many of the streets are not only unpaved, but so rough the smoothest portions are those worn into paths by the tramp of thousands of bare feet day after day, year after year. Some of the streets

Fig. 4. The shade of the plaza is always occupied by men and women discussing the events of the times. Like the Khirghiz nomads, these people are capable of great exertion when necessary and also capable of resting between such periods.

Fig. 5. Many children play in the plaza. They are quiet and well-behaved at all times, tho they seem to have lots of fun.

are impassable mud holes, the pools of water covered with green scum.

The spacious plaza is surrounded by trees, a bandstand in the center with walks lined with flower beds radiating in all directions. The plaza is beautiful, always full of people sitting in the shade of the trees or wandering between the flowers. Indian children play quietly along the walks getting just as much fun out of their play as incorrigible American children playing wild Indian. Mexican Indian children are without exception the best behaved children we have ever encountered. However, quite often boys and girls of 15 to 20 years of the so-called better families are as rude as those of similarly situated American families.

Of course the church faces the plaza at Iguala, but stands back

about fifty feet from it. This is unfortunate for the church since the market surrounds it on three sides and has gradually spread out in front of it until tradesmen's booths almost hide the edifice.

The market, itself, is extensive, not only occupying many square yards of roofed-in space, but spreading over all the streets nearby. Some of the streets occupied by the overflow are shaded by large cotton sheets stretched from the buildings on either side of the street. In other streets the venders sit in doorways, their wares, if not quickly perishable, spread out in the glaring sunlight. The

Fig. 6. The market spreads over all the nearby streets. Women sit on the sidewalks, their wares exposed to the bright sunlight. Most of the Indians are very dark with a reddish tint to the skin. Their hair is straight and black.

Fig. 7. Another street adjacent to the market. The streets near the plaza are cobbled, slanting toward the center of the street. This forms a depression down which rainwater flows and where too, waste water is thrown to run off or evaporate in the hot sun.

pedestrian walks in the middle of the street in such places. However, the sidewalks are so narrow it is easier to walk there anyway.

The Iguala market is exceptionally large and draws trade from a wide area in which there is a climatic range from tropic to almost Arctic climates. This results in both horizontal and vertical trading which are illustrated by the farmer who trades rice for sugar cane, both produced in the same climate while two other farmers exchange bananas and apples, representing two climatic zones, while a third set of exchanges might involve coffee as intermediate between the tropical and the temperate producing areas. An extreme example, an actual case of which we witnessed three years ago in this region was ice formed on the mountain tops being sold in the hot lowlands. It had been cut from streams or ponds at high

elevations and still contained dirt and weeds rendering it unfit for use except as an indirect cooling agent.

One may obtain practically anything he needs in such a market, if he does not try to maintain a higher standard of living than that existing in the surrounding region. Some of the methods of selling are unique. The meat display is large and consists of beef, pork, mutton, goat, fowls, rabbits and even reptiles. It is possible to buy a piece of meat from any portion of the carcass by simply pointing to the spot where one wishes a chunk cut off. On the counters selling fowls are piles of legs, wings, breasts, livers, gizzards, etc., and one may buy as many of one kind as he desires. We purchased a half dozen chicken legs one day, the attendant first wrapping them in cool, wet leaves, then covering the package with a large dry leaf assuring us they would be fresh for a long time. Another day we purchased a piece of meat from a side of beef and asked to have it cut into steaks. The attendant sliced it skillfully, then taking each piece of meat, he laid it on a flat stone and pounded it with a wooden paddle. He informed us such procedure would make the steaks deliciously tender. They were. The venders also have grinding machines and will make hamburger when requested. However, the machines never look very clean.

The hardware market is striking. In addition to new materials, there is a great display of second-hand articles, especially nuts, bolts, screws and nails. The piles look like they had been culled from a dumping ground. However, when one is in search of a nut or bolt the like of which he cannot buy in a hardware store, he may be able to find it in those piles. They are always surrounded by men hunting for certain pieces and the price of any piece which suits the needs of the customer is the same as tho the article were new. It may be even higher for the trader has been watching the customer search, gauging his need for whatever he is after, and charges what he thinks the customer will pay.

A survey of the market shows the foodstuffs are good and the prices low. The products of local handicraft are well-made, and indicate skill, unlimited patience and love of the artistic. Materials brought in from beyond the local trading area are for the most part, very poor in quality and too high in price. A geographic analysis of the market in all its phases produces much interesting information concerning the region.

Iguala is connected with Mexico, D.F., by railroad but the grades are steep and such transportation is costly. Some mining

is carried on back in the mountains, there is some subsistence-type manufacturing in the city, but the chief function of the community is to serve as a trading center of an agricultural region. Being off the automobile highway, Iguala does not enjoy much tourist trade and seems to make no effort to get it. Other Mexican towns adjacent to paved highways are changing very rapidly. Acapulco is paving its streets, laying out sub-divisions, building new hotels and remodeling old ones to take care of the increasing number of visitors it is already having difficulty in accommodating. Mexico is becoming a land of change. It is starting with the accumulated knowledge of the modern world to aid its progress. The pace should be rapid. It is not logical to expect Iguala to resist modernization much longer.

EGYPT'S PLACE IN THE WORLD COTTON DRAMA

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INTRODUCTION OF COTTON INTO EGYPT

A little over a century ago, Jumel, a French-Swiss engineer, saw cotton plants grown for purely decorative purposes in the garden of Maho Bey in the city of Cairo. At once he recognized the possibilities of growing cotton for commercial production. He succeeded in interesting Mohammed Aly, the founder of the present Egyptian dynasty, who undertook the task of cultivating a new Jumel or Maho cotton as a perennial. Its production on a large scale soon proved to be a successful commercial enterprise. Pleased with the results, Mohammed Aly tried further experiments. Foreign seed was imported, principally Sea Island and Brazilian. Thru the contagiousness of Jumel's enthusiasm, Mohammed Aly caused the development of the annual type of cotton that was purely Egyptian. Its long, strong fibres of fine quality, silky texture, and brown color, have given it a very high value and created for it a special Egyptian market.

The growth of the cotton has been dependent upon the growth of irrigation facilities. Because primitive methods of lifting water prevailed during Mohammed Aly's time, cotton was an unprofitable crop when compared with other staples. For example, one water wheel with eight oxen irrigated three feddans of cotton,[1] as compared with a combined cultivation of seven feddans of wheat, two feddans of millet, and eight feddans of Indian corn.

Under the conditions just cited, one wonders why cotton was grown at all. The secret rests in the fact that the cultivator had no choice in the matter, but was compelled to grow it. Compulsion, however, with regard to cotton cultivation ceased with the death of Mohammed Aly in 1849. There is a probability that cotton cultivation might have been given up entirely had it not been for a combination of factors that intervened.

INFLUENCE OF THE CIVIL WAR AND OTHER FACTORS

Certain factors, together with the Civil War in America which resulted in a serious depletion of the world's cotton supplies, caused the price of cotton to rise rapidly. The purchase of all cotton

[1] One feddan equals 1.038 acres.

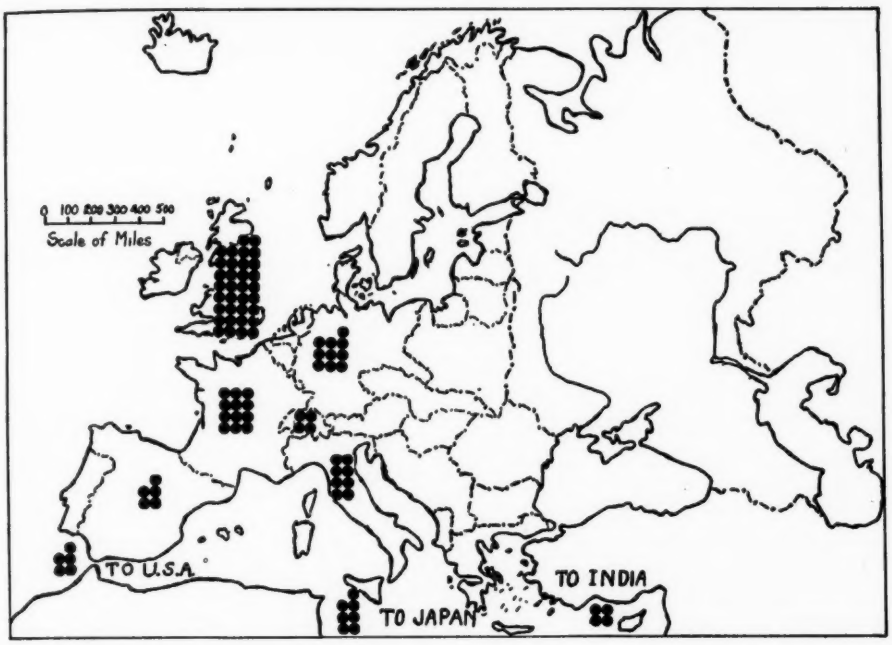

Fig. 1. Importing countries of Egyptian cotton. One dot represents one per cent of Egyptian cotton exports. The computations represent a five-year average from 1930 to 1934. The figures were compiled from the 1933-1934 Annuaire Statistique, Ministry of Finance, Egyptian Government, Cairo, 1936.

grown in Egypt was a state monopoly before Aly's death, but after that it was abolished. Also, an export duty was gradually reduced from 10 to one per cent as a result of a Turkish treaty. Thus, a new impetus was given to cotton cultivation, and the importance of the Egyptian crop as a part of the world's supply was established. At the beginning of the conflict, the British cotton mills were dependent upon the Southern States of the United States for nearly 90 per cent of the raw staple. Less than five per cent of the cotton imports of the United Kingdom in 1860 came from Egypt. India supplied some cotton to England, but it was no substitute for the high quality American product. On the other hand, Egyptian cotton was the best of any except the Sea Island fiber. Thus, Egypt won a place for itself in spite of the Indian competition, as much of the "Surat" or Indian cotton was of short staple, ill-prepared, ill-cleaned, and even adulterated with mud, leaves, and stones. Furthermore, Manchester had never liked the Indian variety.[2]

[2] W. T. M. Torrens. Lancashire's Lesson; or The Need of a Settled Policy in Times of Exceptional Stress, pp. 10 and 16. Trubner and Company, London. 1864.

Less than five per cent of the cotton imports of the United Kingdom came from Egypt before the American Civil War, but the picture changed after the struggle was over. For the five-year period 1930 to 1934, England received 34 per cent of the total of Egypt's cotton exports, which represented slightly less than 20 per cent of the Island's average imports, as the five-year period 1924 to 1928 indicated (See Fig. 1). It is not as dependent upon Egypt's crop now, however, as it was upon the crop of the United States during and before the Civil War.

EGYPT'S PLACE IN WORLD COTTON

From the whirl of events during and following the Civil War, Egypt won a place of importance in the world's cotton drama. Primarily an agricultural country, cotton comprises about 85 per cent of the exports and five-sixths of the population live on the land. Egypt manufactures little and depends largely on cotton for the imports of manufactured goods.

For the five-year period 1929-1930 thru 1933-1934, Egypt ranked fifth in world cotton production (See Fig. 2.). For the same five-year period, it produced about six per cent of the world's total.

Egyptian cotton is, after Indian, the leading competitor of the staple produced in the United States. Regardless of the fact that Russia and China produce more fiber than Egypt, Egypt's product is commercially more significant, for the Russian and Chinese products do not move in international trade.

CHIEF SOURCE OF LONG STAPLE COTTON

Today agriculture represents 85 percent of the value of all production in Egypt. Of this share, cotton accounts for nearly 43 per cent. In fact, about 35 per cent of all cultivated land in Egypt is under cotton each year. Furthermore, Egypt grows from 40 to 50 per cent of the long staple cotton (1 1/8 inches or longer) produced in the world, while the United States raises 20 to 25 per cent. Egyptian cotton is characterized by its unusual strength, length, luster, and silkiness. It is widely used in the manufacture of fabrics requiring lightness and durability. At present, about one-third of the crop is of the extra long staple varieties of over 1 3/8 inches fiber length. The remainder consists mainly of so-called "Uppers," a cotton having a staple length of 1 1/8 to 1 3/16 inches. For purposes of convenience, the Egyptian crop is classified under three

categories, namely, short, middle, and long staple. The former, or Uppers type, is 1 3/16 inches or less; middle staple cotton is 1 2/8 to 1 5/16 inches, while long staple or "Sakellaridis" type is 1 3/8 inches and over. The Egyptian government at present is encouraging the cultivation of eleven varieties of which five are long staple

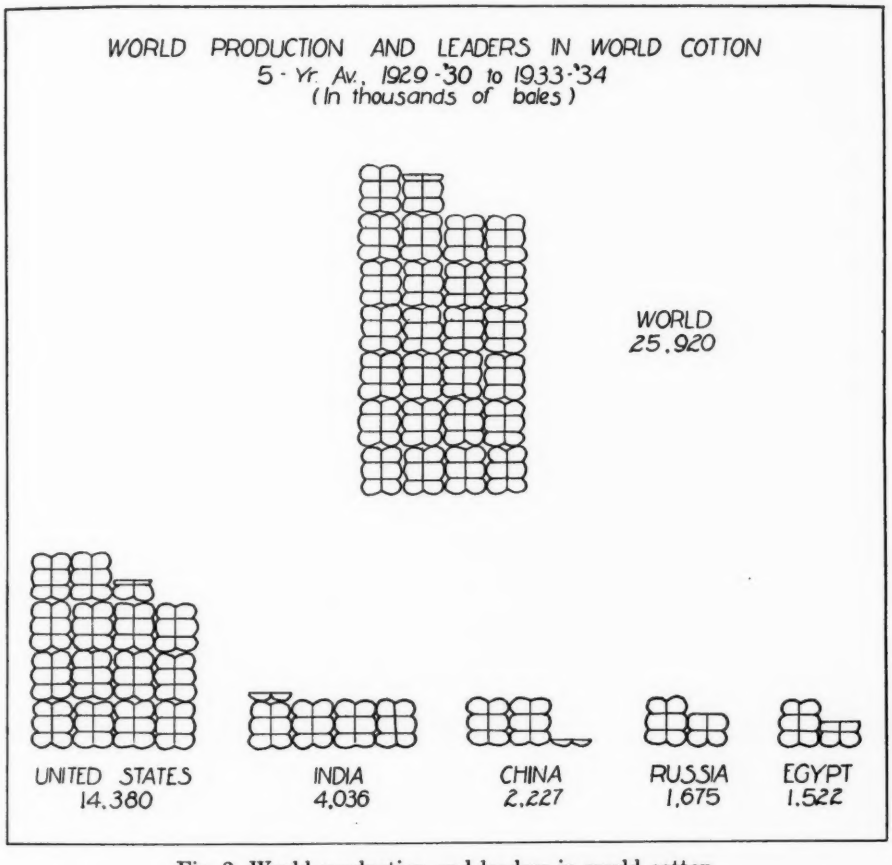

Fig. 2. World production and leaders in world cotton

cotton, four are of the medium staple, and two, the so-called Uppers varieties, short staple types. During recent years there has been a marked trend away from the cultivation of long staple cotton. At one time it accounted for two-thirds to three-fourths of the crop, but today it amounts to only one-third. If present government policies continue, only 20 to 25 per cent of the crop will consist of long staple varieties.

COMPETITION

A long staple, Sakellaridis, cotton competes directly with cotton grown in Arizona, whereas Uppers is a competitor of long staple cotton from the Mississippi Delta, Arkansas, Louisiana, and South Carolina. Egyptian cotton must also compete in some degree with the products of other countries which have stimulated production recently, largely as a result of the American acreage restriction program. In most of them it is beyond the experimental stage.[3]

PRICE OF SAKELLARIDIS

One reason for the former large acreage of Sakellaridis was its wide price margin over the shorter staples. During the six years 1924-1925 to 1929-1930, the price of Sakellaridis averaged 32 per cent above that of Uppers, but in 1932-1933 the price margin was only 11 per cent. Because of this narrow margin, together with the fact that the long staple cottons have relatively lower yields and lower gin turnouts than shorter staples, there has been a marked trend toward raising a shorter staple, higher yielding cotton.[4] In spite of the Egyptian farmers being alarmed over a low yield, their crops average twice that of the "rain grown" cotton of the United States.

SUMMARY

Egyptian cotton has become a symbol of a high quality product and with the extension of irrigation facilities, it has come to be a great money crop. In its early stages, however, the American Civil War probably saved the fate of the Nile fiber by giving its production a new impetus. About one-half the world's supply of long staple cotton comes from this Nile country, but this picture may change in the near future because of the new government policies, competition, and the small price margin given Sakellaridis over the higher yielding Uppers. Also, we must not lose sight of the fact that Egypt is a monocultural country, that is, at the mercy of modern inventions and discoveries which make its position even more precarious. Its fate began with cotton and will probably end with cotton—but time will tell!

[3] Cotton Production and Marketing in Egypt. Unpublished report of Division 23, Bureau of Foreign and Domestic Commerce, Washington, D.C. July 15, 1935.

[4] P. K. Norris. Cotton Production in Egypt. Technical Bulletin No. 451, pp. 32-33. U. S. Dept. Agr., Washington, D.C. 1934.

THE RIDDLE AS A GEOGRAPHIC TEACHING DEVICE

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Riddles have recently become a recognized teaching device in geography. The concept has been considered sufficiently useful and sufficiently different from other geographical devices to be listed in the last three revisions in the geography outlines of the North Dakota state course of study. The riddle may become an important device in teaching geography.

The dictionary definition for riddle is "enigma," "something ambiguous," etc. Such definitions cannot be considered more than a starting point. Only those riddles with definite utility for geography were selected. Classroom practices soon changed the original meaning in accordance with student needs. A riddle for classroom purposes has come to mean either a problem so intricate or a question so complex that the solution requires considerable effort and knowledge on the part of the one assigned to solve it.

The writer feels that the definition should be more specific for several reasons. It is necessary to distinguish riddles from other geographical devices, such as questions and problems. Standards should be set to make the method of greatest use for teachers. A specific definition will also permit teachers to analyze, select and even make riddles for their geography classes.

The following four riddles are taken from different subjects and from different age levels.

A. The place I am at seems strange to me. Armadillas and iguanos (the latter are lizards), are eaten by the natives. At noon the shadows fall to the south for about six weeks, and during the remainder of the year, altho the shadows fall northward, they are very short at noon. Where am I?

B. The country consists chiefly of two islands of nearly the same size. Their mid-summer is in January. The islands are inhabited by people whose ancestors came from Great Britain which is only slightly greater in area. Name the country.

C. I am used chiefly for my leather and my fur. I am bigger than a dog or a sheep. I carry my young about in a pouch. I hop rather than run. What am I?

The above examples show the versatility of riddles for geographi-

cal purposes. They can be adapted to a large variety of physical, human, and other phases of geography, and also lend themselves very well to various grade levels. An analysis of the riddles will show some of their characteristics.

In the first example for mathematical geography, the latitude is designated by the sun. Since the shadows fall southward a part of the time and northward most of the time, the location is definitely between the equator and the Tropic of Cancer. Since armadillas are found only in the Americas the location must be Mexico or Central America, and not any tropical location elsewhere.

In the second riddle the limiting factors are (a) two islands of nearly the same size, (b) a January mid-summer, (c) area slightly smaller than Great Britain. The January mid-summer definitely places the country in the southern hemisphere. The facts of ancestry and area now definitely eliminate all countries except New Zealand.

The third example is on a juvenile level. It has five limiting factors.

The following examples are intentionally faulty:

D. It is the largest continent in the world. This continent has the most people in the world. Since the answer can be determined by either statement it is not a riddle from an educational standpoint. One or two questions would serve the purpose better than a riddle.

E. It produces the world's most rubber. An important naval base is located at the end of the peninsula. The single question "What country produces the most rubber?" would serve educational purposes better than the above riddle.

A riddle for geographical purposes therefore, is a type of problem which includes several limiting factors no one of which in itself betrays the answer. On this basis the geography teacher can easily distinguish the device from other methods. The teacher, cognizant of the psychological background may better determine the utility of riddles and select them for classroom purposes. The geographer who knows the nature of this relatively new device may intelligently create riddles of his own, and even teach students to create them.

INTEREST-STIMULATING DEVICES

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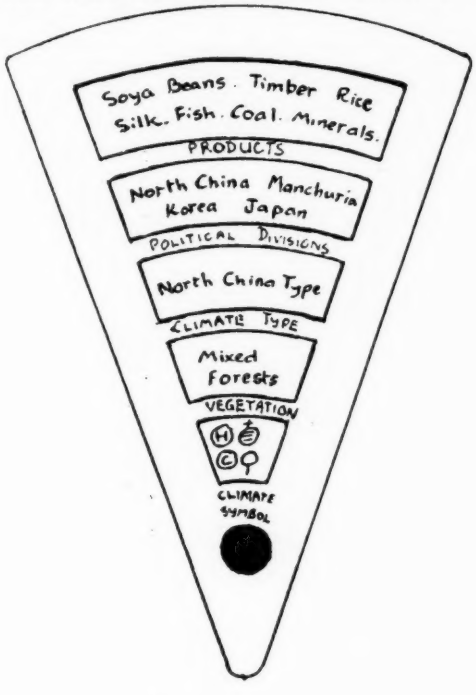
An interest-stimulating device should be of such a character that information appears secondary, the horizon of the pupil being dominated by something in which he is instinctively interested, and which appears to him a worthy end for which to work. The follow-

THE CLIMATIC REGIONS OF EURASIA



Kenneth Warden

ing device demands considerable initial work in assembling sets of related geographical facts, but to pupils this appears secondary to the production of a rotating disc which has the novelty of producing any single set of facts simultaneously, and concealing all other sets. As an example of method, treatment of the Hot Belt is considered.

The Hot Belt can be divided into three distinct types, Tropical Forest, Savanna, and Desert. A disc of plain paper, radius about

three inches, is divided into three equal sectors. In each sector is printed along concentric arcs, information appropriate to each type, for example, the Climate Symbol,[1] Climate Type, Vegetation, Chief Products, and Political Regions. A sector of the same angular dimension, but of slightly smaller radius is cut from a page in the note book, leaving however a small portion at the apex unremoved. The disc is then placed beneath the page and fixed in position by a paper pin at the centre. As the disc is rotated, each sector comes into view. The device has a fairly wide application and is not limited to geography.

Refinements and improvements come with age and ability. Sectors can be suitably colored. The "window" need not be cut away in one piece, but arc-bars left upon which to print the words Climate Symbol, Climate Type, etc., indicating the position occupied by each piece of information in the sector. Appearance is made more attractive by a cellophane window, with border in India ink.

. . . . . .

A second device on somewhat similar lines is useful to show seasonal position of the sun and changes in wind direction between South East Asia and North Australia.

In the middle of a right-hand page of the note book a map is traced of that part of the world bounded by parallel 45° north and south, and meridians 60° east and 160° east. The Equator and Tropics are marked. The map is then traced thru onto the next page so that there are two identical maps on successive pages. By cutting along the three lines bounding the first map south of the Equator, a flap is produced which can be turned up along the Equator and which exactly conceals the upper half of the first map, at the same time exposing the lower half of the second one. On the underside of the flap, when in its raised position, the upper half of the second map is redrawn, and the two pages gummed together. By raising and lowering the flap, two complete maps of the area are to be seen.

With the flap down, or window closed, the sun is drawn in its January position over Australia, and arrows carefully placed to represent the monsoons of Asia and the northwest monsoons of North Australia. The arrows are repeated in exactly the same positions with the window open, but with the tips on the opposite ends. The sun is moved to its position over the northern Tropic. The wind belts are named on both maps. By printing just above the rectangle

[1] See Journal of Geography, 1936, pp. 34-37.

enclosing the map "This map shows the Sun's Position and Direction of Winds in"—and the word JANUARY inside the rectangle, the month is concealed when the window is opened, and the word JULY is printed in its place on the flap. The novelty of the device for changing round the month, the sun and the winds, appeals strongly to children, who do not tire of raising and lowering the window. The extra time taken as compared with drawing two simple maps is well repaid by the increased interest, which is so marked that after explanation the four following points can be printed beneath the maps and learned without drudgery:

1. Winds always blow from High to Low.
2. Winds deflect to the right in the North Hemisphere and to the left in the South Hemisphere.[2]
3. A Trade Wind which has crossed the Equator and become deflected is called a Monsoon.
4. In Asia the word Monsoon means a Seasonal Wind.

The device is applicable in other ways, for example for the conversion of a Climate Region map into one of Vegetation. A central line across the rectangle enclosing the map marks the position of the flap hinge. This crease is of value in fixing ideas when made to coincide with some significant line such as the Equator, its natural place on maps of Africa treated this way.

[2] See JOURNAL OF GEOGRAPHY, 1932, pp. 305-307.

EDITORIAL NOTES AND NEWS

An analysis of the types and amounts of cargo carried on the Ohio is found in E. F. Brown's Transportation on the Ohio River Route, appearing in the June, 1937, issue of the *Marshall Review,* the new publication of Marshall College, Huntington, W.Va.

DR. HOWARD H. MARTIN, chairman of the department of geography at the University of Washington, received the honorary degree of Doctor of Science from Monmouth College at its 81st annual commencement. Dr. Martin is the retiring president of the Association of Pacific Coast Geographers, and also institute geographer on the staff of the Institute of Foreign Affairs.

According to a press release from the U. S. Department of Agriculture, May 12, 1934, was the first time that Americans had seen dust blow from the plains near the Rockies far out into the Atlantic. Equally wide spread dust storms have swept the country since that date, suggestive of those blowing out of desert Africa on to Nigeria, as well as those that buried villages thousands of years ago in Iraq. In any case, man's unwise removal of the natural grass cover appears to have started the trouble.

Those desiring first hand information from specialists in the field of conservation will find eminently helpful articles on soil and water conservation, flood control, practices and policies relative to basic land use planning, in the regular monthly issues of *Soil Conservation,* official organ of the Soil Conservation Service, United States Department of Agriculture, Washington, D.C.

The New York Geographical Association at its May meeting held at Syracuse voted to affiliate with the National Council of Geography Teachers. The name and local organization remains unchanged. The past three years, this young and active organization has been headed by Dr. George Cressey of the Department of Geography of Syracuse University, the latter serving as host for the meetings. This fall the meeting will be held at the Cortland State Normal School with Dr. A. K. Botts as president. Melvina Svec of the Buffalo State Teachers College is the secretary and historian.

Among the out-of-the-states travellers of whom news has reached the JOURNAL are, Dr. H. H. Martin, University of Washington, who spent the summer in the Orient; Edith Parker, University of Chicago, at present in Europe; Dr. William E. Haas, Northwestern University, in western Canada; Mattie Sue Walker, Commercial High School, Atlanta, Ga., and Mary Gwen Shaw, State Teachers College, Mankato, Minn., in Mexico; Dr. Marguerite Uttley, Iowa State Teachers College, in Guatemala; Dr. Eugene Van Cleef of Ohio State University, in Poland; Ovid M. McMillion, State Teachers College, Athens, W.Va., in England.

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Baranowice, A Landed Estate in Polish Silesia. By Loyal Durand, Jr. 289

Dr. Durand is a member of the geography staff at the University of Wisconsin, and joint author of the new book, "Our Working World." The intimate picture of a large Polish estate and of life on that estate, as portrayed in this paper, is a result of his field studies in Poland.

The next article in our series on Europe will present an intimate picture of the Port wine industry of Portugal. It was written by Edward A. Ackerman of Harvard University.

Unusual Weather Visits Southern California. By Willis H. Miller 299

Dr. Miller is Economic Geographer for the California State Planning Board, in charge of research. He was formerly in Los Angeles Junior College.

It is generally accepted that wherever we happen to be at a given time "unusual weather" prevails. Such conditions even occur in "The Land of Sunshine."

A Study of a Permanent Alabama Lumber Town. By George M. Hudson 308

Mr. Hudson is a teacher of social science in the public schools of Mobile, Alabama.

Have you ever attempted to direct your high school students in a local field study of this type? The possibilities are very great. Such a study would be an excellent extra-curricular activity.

Village Life in Korea. By Anne C. Kim 315

Miss Kim's home is in Kyung Won Sun, Dong do Chun, Korea (Chosen). She has been studying in America for some twelve years, graduating from the Wadleigh High School in New York City. At present she is a senior in Mount Holyoke College. After graduation she expects to return to her native land. The pen picture which she presents is extremely interesting. Try reading it to your children.

An Experiment in Teaching Current Geography. By Frances C. Repass 321

Miss Repass is supervisor of the junior department in the Junior-Senior High School, Spearfish, South Dakota, and teaches the social studies in the seventh and eighth grades.

Read this article and then test your students on current geography. The Editor tried it with college students. The results were shocking.

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